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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/643,401	08/19/2003	Raymond G. Freuler	POWRD-015C	3992

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EXAMINER	
EGAN, BRIAN P	

ART UNIT	PAPER NUMBER
1772	

DATE MAILED: 09/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/643,401	FREULER ET AL.	
	Examiner	Art Unit	
	Brian P. Egan	1772	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-15 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-15 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 11/19/03; 11/24/03.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freuler et al. (#5,912,805) in view of Duvall et al. (#6,391,442).

Freuler et al. teach a thermal interface for facilitating heat transfer from an electronic component to a heat sink (Col. 7 Line 30) comprising a planar substrate (Col. 7 Line 31) having first and second surfaces (Col. 7 Lines 31-32) wherein the peripheral edge of the substrate extends substantially beyond the surface between the electronic component and the heat sink (Col. 8 Lines 4-8) and the peripheral edge is coated with a localized adhesive (Col. 5 Lines 43-50) that has a peel-away protective layer made of paper that is coated with silicone (Col. 8 Lines 33-45). Freuler et al. also teach heat conductive compositions containing paraffin along with additives that enhance thermal conductivity formed upon the first and second surfaces of a substrate (Col. 1 Lines 28-35 and Col. 7 Line 41- Col. 8 Line 3) and a substrate comprising a thermally conductive metal foil (Col. 8 Lines 14-16), aluminum (Col. 8 Lines 17-22), which is approximately 0.002 inches thick (Col. 1 Line 30) and has a melting point of approximately 51 degrees C or higher (Col. 8 Lines 23-26). Freuler et al. discloses the claimed heat conductive composition except for the thickness of 0.00065 inches. Freuler et al., however, further disclose that the thickness of the layer of thermal compound is adjustable depending on the end use of the

product (Col. 5 Lines 1-5). Thus, it would have been obvious to one of ordinary skill in the art at the time Applicant's invention was made to have modified the thickness of the layer depending on the end use of the product as shown by Freuler et al.

Freuler et al. do not disclose the composition of the 'additives that enhance thermal conductivity' that is detailed in column 1, lines 28-35. Therefore, Freuler et al. fail to teach the use of graphite and a synthetic resinous polymer in the heat conductive composition.

Duvall et al., however, teach a phase change thermal interface material that comprises from 10-80% of polymer (which may include synthetic resinous polymers (Col. 5, line 66 to Col. 6, line 11)), 10-80% filler (which may include graphite with a particle size between 2 and 100 microns (Col. 5, lines 38-46)), and 10-80% melting point component (which may include paraffin (Col. 6, lines 20-22)) (Breakdown of composition located at Col. 6, line 60 to Col. 7, line 3). Although Duvall et al. do not explicitly teach the synthetic resinous polymer to be within the range of 5% composition, Duvall et al. state that the specific formulation of the film is preferably selected according to the conditions to which the film is to be exposed, thereby allowing for customized adjustment and control for viscosity, thermal conductivity, and heat melt/flow properties to allow precise performance matching to various applications or requirements (Col. 5, lines 22-28). Therefore, it would have been obvious through routine experimentation to one of ordinary skill in the art to modify the synthetic resinous polymer content depending on the desired end product. Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum range or workable ranges involves only routine skill in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980). Duvall et al. teach the phase change thermal interface to include paraffin, graphite, and

synthetic resinous polymers for the purpose of providing a material with a melting point component (paraffin) that allows the material to alter its melting point (Col. 2, lines 20-23), a filler (graphite) that helps to increase the thermal conductivity of the phase change material (Col. 5, lines 29-46), and a polymer (synthetic resinous polymer) that provides the phase change material with body (viscosity) to prevent the melting point component and filler from flowing out from between the heat sink and the heat source (Col. 6, lines 28-31). It would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to have combined the teachings of Freuler et al. and Duvall et al. since each of the aforementioned references are analogous insofar as being directed at phase change thermal interface pads.

Therefore, it would have been obvious to one of ordinary skill at the time applicants invention was made to have modified Freuler et al. to include graphite and synthetic resinous polymers as part of the additives that enhance thermal conductivity along with paraffin as taught by Duvall et al. in order to provide a material with a melting point component (paraffin) that allows the material to alter its melting point, a filler (graphite) that helps to increase the thermal conductivity of the phase change material, and a polymer (synthetic resinous polymer) that provides the phase change material with body (viscosity) to prevent the melting point component and filler from flowing out from between the heat sink and the heat source.

3. Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freuler et al. ('805) in view of Eaton (#5,930,893) and Grapes et al. (#5,002,715).

The teachings of Freuler et al. are relied upon as detailed above. Although Freuler et al. teach the use of additives that enhance thermal conductivity (Col. 1, lines 28-35), Freuler et al. fail to explicitly state that such thermal conductivity enhancers are in the form of graphite and/or

synthetic resinous polymers. Therefore, Freuler et al. is silent towards the teaching of the specific composition of the heat conductive layers.

Eaton, however, teaches a thermally conductive material that is to be placed on both sides of a unitary intermediate substrate (Col. 3, lines 53-58) that comprises paraffin (Col. 4, lines 28-29), ethylene vinyl acetate copolymer (in the form of ELVAX – a synthetic resinous polymer) (Col. 4, lines 30-34), and heat conducting particles (Col. 6, lines 1-5). Although Eaton does not specifically state that the heat conductive particles are graphite particles, it is notoriously well known in the art (and evidenced by Grape et al. (see Abstract)), that graphite is one form of a heat conducting particle that is used in the heat sink art. Eaton gives a first example of the material which comprises 95% paraffin and 5% ELVAX (Col. 4, lines 28-40). Eaton further states that although the above has been discussed without the use of any heat conducting particles in the compound or barrier, it is understood that heat conducting particles may also be used which may further decrease the thermal impedance of the thermal joint/path (Col. 6, lines 1-5). Eaton does not explicitly teach the material comprising a range of paraffin between 60 and 90% and a range of graphite between 10 and 40% although Eaton states that the melt temperature of the resulting compound can be varied between 20 and 100 Celsius and chosen according to the initial and normal operating temperatures of the component (Col. 4, lines 58-61). Therefore, it would have been obvious through routine experimentation to one of ordinary skill in the art at the time applicants invention was made to have modified the composition of the material according to the desired melt point of the material and the initial and normal operating temperatures of the component. Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum range or workable ranges

involves only routine skill in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980). Eaton teaches the use of the aforementioned material for the purpose of providing a heat sink with a thermally conductive material that decreases the thermal impedance of the thermal joint/path (Col. 6, lines 4-5) and to provide the heat sink with ELVAX to maintain the integrity of the joint (Col. 5, lines 48-67). It would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to have combined the teachings of Freuler et al. and Eaton since each of the aforementioned references are analogous insofar as being directed at thermally conductive material substrates.

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicants invention was made to have modified Freuler et al. to include ELVAX and graphite in the heat conductive composition material layers as taught by Eaton in order to provide a heat sink with thermally conductive material that decreases the thermal impedance of the thermal joint/path and to maintain the integrity of the joint through the use of ELVAX.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian P. Egan whose telephone number is 571-272-1491. The examiner can normally be reached on M-F, 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Y. Pyon can be reached on 571-272-1498. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BPE 8/30/04

NASSER AHMAD
PRIMARY EXAMINER
Acting SPE 9/1/04